

Handling Digital Photographs for Use in Criminal Trials V1, May 27, 2004

This is a DRAFT guide that may - once fully developed - be used by law enforcement to ensure that digital photographs (pictures taken with digital cameras) are admissible in court. This DRAFT has not been adopted or approved by any agency, department, or entity.

I solicit your comments, similar guides, forms and views so we can have a workable guide for this needed process. keith.hodges@dhs.gov. (912) 554-5757. FAX: (912) 261-3635

The scope of this DRAFT is limited to still, digital photographs taken by first responder law enforcement and some crime scene personnel. It assumes that the digital camera used flash media to store the images, as that is the case with most cameras today.

This guide does not address:

- Audio or video files.
- Evidence seized by law enforcement at a crime scene.
- Many aspects of "non-traditional enhancement*" performed in crime labs and other settings. (* Definitions of tradition and non-traditional enhancement is at the end of this guide.)

There are many ways to handle digital photographs to defeat the most common challenges in court. Among those challenges is the assertion - usually without any basis - that the photograph taken by the officer might have been altered. The use of verification and encryption software, camera firmware, watermarking, and other methods were considered for inclusion in this DRAFT, but were not included for a variety of reasons. The primary reason is that most law enforcement officers serve in small departments that may not have the resources to afford advanced equipment or training. Many departments also do not have sufficient personnel to dedicate an officer or support staff to managing digital photographs. This DRAFT was designed to combine simple procedures that anyone with rudimentary computer skills can execute: how to use a digital camera in default-setting mode, make a CD/DVD, and delete files.

This DRAFT includes not only the steps, but to assist commentators, the reason for some of the less-than-obvious choices in developing the DRAFT.

Many other works use various terms to describe originals, copies, and duplicates. Commentators should not be distracted by the labels *Master Negative* or *Negative Duplicate* used in this DRAFT. Once the procedures are settled, those in the field can decide the best term. Whatever term this DRAFT uses, it will not affect how the Courts define an original, duplicate, or copy.

This guide was developed through research by many, advice from those in the field, and other draft procedures. Many of the materials consulted along with this draft in several file formats, can be found at: <http://www.khodges.com/digitalphoto/>. Future drafts will also be posted there.

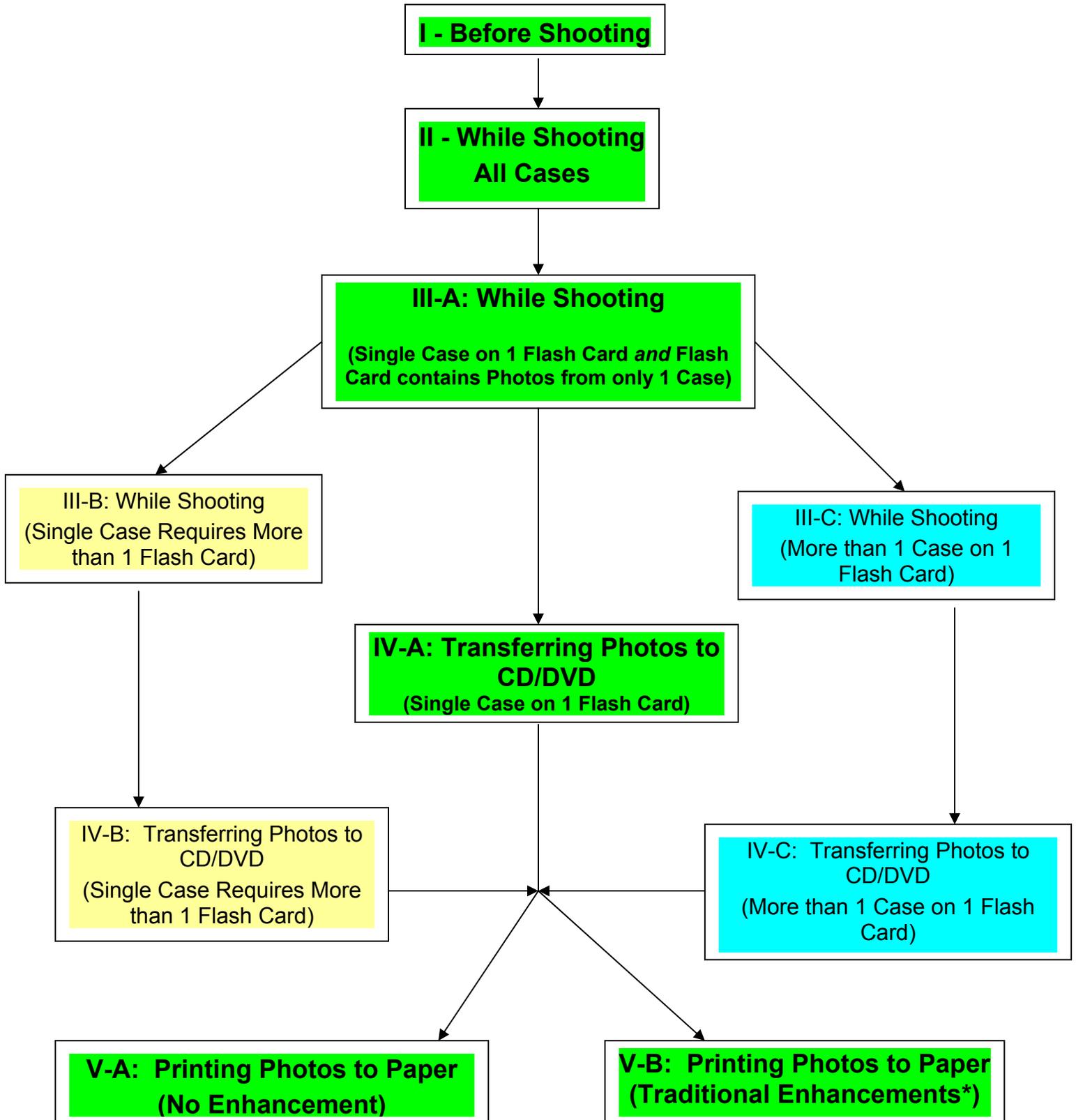
Particularly useful in developing this DRAFT was *Digital Image Procedure*, prepared by the Police Scientific Development Branch, Association of Chief Police Officers (England, Wales, and N. Ireland) viewable at: http://www.homeoffice.gov.uk/docs2/17_94digitalimagingproc.pdf

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**Alternate
Procedure**

Recommended
(Whenever feasible)

**Alternate
Procedure**



A DRAFT Guide for Handling Digital Photographs Taken by First Responders and Crime Scene Personnel

Step	Rationale / Comments
I- Before Shooting	
I-1. Ensure the media (flash card) is blank before shooting.	?? Is it safe to advise formatting the flash card, or are there some flash cards for which this should not be done?
I-2. Use the manufacturer's default camera settings. Exceptions: a. Confirm date stamp is correctly set. b. Do NOT have the date stamp imprinted onto the image itself. c. ?? Turn on-red eye reduction. d. If the default file format is JPEG or BMP, set to TIFF or a loss-less, raw data format. e. Use a file size of at least ___ mega-pixel. f. Experienced photographers who need advanced settings should use and document them just as they would when using film.	Using default settings reduces the need to write down camera settings. By using default settings wherever possible, one knows how the camera was set. If every user changed settings on a camera to suit their needs, it might be difficult to prove what settings were used later should that become relevant. a. If this setting is incorrect, it provides fodder later to claim that a digital file was altered. b. The imprint may obscure valuable information in the photo. Further, the date the photo was taken is saved in the filename itself. c. Without red-eye reduction, photos of people look unreal. This is especially true with digital cameras. We do not want officers to have to explain the red-eye effect. d. This will avoid possible compression issues later. e. ?? Whatever the experts say.
I-3. The first photograph should be of a placard to establish the identity of the images to follow.	Formats for placards to be developed later. In the interim, use the same placard as used in film photography.

II - While Shooting	
II-1. Do not delete any photos from the flash media.	It is best if officers can testify, "I follow a standard procedure to never delete photos, no matter how bad they are." The defense will always claim that the deleted photo is the one that proves the client innocent.
II-2. Do not alter any images - such as to change orientation or the file number, name, or date - at any time.	The idea is that the final product that will go onto the <i>Master Negative</i> is exactly what the camera saw when the shutter was snapped.
III-A: While Shooting - Single Case on 1 Flash Card and Flash Card contains Photos from only 1 Case	
(Recommended when feasible)	
NOTE:	
<ul style="list-style-type: none"> • If shooting multiple cases on one flash card, see section III-B. • If the photo session requires more than one flash card to complete, see section III-C. 	
III-A-1. Shoot a placard at the end of the case.	Formats for placards to be developed later. In the interim, use the same placard as used in film photography.
III-A-2. Use Procedure IV-A to create a <i>Master Negative</i> CD/DVD.	

"Digital Evidence Custodians"

1. Some departments may wish for the officer who takes the digital photo to be the one to create the Master Negative and Negative Duplicate described in procedure IV. In other departments, because of the level of computer skills of officers, the officer who takes the photos may turn over the camera or the flash card to another for the making of the Master Negative and the Negative Duplicate.
2. In those instances where a person other than the one who took the digital photos performs procedure IV, that person might be designated a "Digital Evidence Custodian." (The designee does not have to be the regular evidence custodian.) This Custodian would have the time and expertise to move the digital photos from flash memory to the Master Negative and make the Negative Duplicates.
3. When using a Digital Evidence Custodian, that Custodian should document from whom, and when and where, the flash card was received. This step will help demonstrate in court that the digital photos were not altered.

IV-A: Transferring Photos to CD/DVD - Single Case on 1 Flash Card

and

IV-B: Single Case Requires More than 1 Flash Card

NOTE:

If there is more than one case photographed on a single flash card, use procedure IV-C

IV-A/B 1: Using a CD or DVD creation program, copy all images directly from the flash card to a blank CD-R or DVD-R (not CD-RW or DVD-RW). Select the "finalize" option in the software. Do not open and "save as."	Later drafts will have a short explanation about the difference between a final and open CD-R, with samples from the most common software.
IV-A/B 2: Confirm that the creation of the CD/DVD was done correctly by: a. Opening the CD/DVD. b. Comparing the number and appearance of the images on the CD/DVD and the images on the flash card. c. Attempting to write a file to the CD/DVD you just created. d. If it is possible to write a file to the CD/DVD, the media was not finalized. Destroy the media just made and create another following the above procedures.	
IV-A/B 3: The CD/DVD that was created as above is the <i>Master Negative</i> . Mark this CD/DVD as such, print out a contact sheet of all images on the CD/DVD, and bag and tag this CD/DVD as you would seized evidence.	
IV-A/B 4: Document the above process.	Forms to be developed at a later date.
IV-A/B 5: Make other CDs/DVDs (using the same procedure as above) that will be needed by other officers, the lab, and the prosecutor. Ensure that sufficient copies are available for those officers that need them. The CDs/DVDs you create here are <i>Negative Duplicates</i> .	While any of the CDs/DVDs created using this procedure can be the source of additional copies, making copies now will avoid having to go to the <i>Master Negative</i> .

Continued

IV-A: Transferring Photos to CD/DVD - Single Case on 1 Flash Card

and

IV-B: Single Case Requires More than 1 Flash Card

<p>IV-A/B 6: Delete all images from the flash card.</p>	<p>?? This is an issue worthy of discussion.</p> <ol style="list-style-type: none">1. Most small departments cannot afford to tie up flash memory for months or years.2. Flash cards are easy to lose or corrupt and can be damaged by improper storage. Files can be accidentally deleted from or altered on flash media.3. If a guide requires keeping the original flash media and a department does not, that will become the subject of defense counsel questions.
<p>IV-B 7: If more than one flash card was used in a single case, repeat the steps in IV-A/B 1-6 for each flash card, thereby having one Master Negative CD/DVD for each flashcard.</p>	<p>While it initially makes sense to put all the photos from one case onto a single CD/DVD, this may create a situation where different images will have the same file name if the camera firmware restarts the image count. In such a case, this may result in either inadvertently overwriting existing files, or force the person creating the CD/DVD to make folders. In the interest of simplicity, it is believed making a single CD/DVD for each flash card is best.</p>

V-A: Printing Photos to Paper - No Enhancement

1. From any <i>Negative Duplicate</i> , open a program that allows you to display and print a digital photograph.	
2. Record the name of the program and the version.	
3. Print the digital photograph.	
4. When providing the print to others, one might note that the print has not been enhanced.	

V-B: Printing Photos to Paper - Traditional Enhancements*

V-B-1. From any <i>Negative Duplicate</i> , open a program that allows you to display and print a digital photograph.	
V-B-2. Record the name of the program and the version.	
V-B-3. Print a copy of the digital photograph before making any enhancements.	
V-B-4. Apply traditional enhancements, noting the adjustments made. (You may be asked to replicate the same enhancements later.)	
V-B-5. When satisfied with the enhancements, save a copy of the image to a CD/DVD or removable media using the same file name as the original plus information in the file name to indicate the image saved has been enhanced. (It will not be possible to save to a properly created <i>Negative Duplicate</i> .)	
V-B-6. If the file being printed is a JPG or other lossy file format, choose save options to eliminate all compression or use as little compression as the software permits.	
V-B-7. Print the enhanced image.	
V-B-8. Mark the unenhanced and enhanced prints as such.	
V-B-9. When providing the enhanced print to others, one might also submit a copy of the unenhanced print for comparison.	It may be a good procedure for those printing enhanced digital prints to always submit an unenhanced version with the enhanced. This process ensures the receiver knows a print has been enhanced and they can visually see the enhancement.

Non-Traditional Enhancements

This guide does not address non-traditional enhancements.
 Non-traditional enhancements should only be performed by qualified personnel with the proper skill, knowledge, training or experience to do so.

III-B: While Shooting - Single Case Requires More than 1 Flash Card	
III-A-1. When possible, shoot an ending placard before the flash memory card is filled. This will require monitoring space remaining on the flash card.	Formats for placards to be developed later. In the interim, use the same placard as used in film photography.
III-A-2. When the flash card is filled and must be removed from the camera so the officer can continue shooting, bag and tag the flash card as you would seized evidence.	Flash cards are fungible and can be easily lost or damaged.
III-A-3. To avoid having images with the same number pertaining to the same case, do not reset the counter on the camera (if equipped).	
III-A-4. Shoot a placard at the end of the case on each card used.	
III-A-5. Use Procedure IV-B to transfer photos to CDs/DVDs creating a <i>Master Negative</i> CD/DVD.	
III-C: While Shooting - More than 1 Case on 1 Flash Card	
III-C-1. Shoot a placard at the end of each case, and the beginning of the next.	
III-C-2. Follow all the steps in procedure IV-C to transfer photos to CDs/DVDS	

IV-C: Transferring Photos to CD/DVD - More than 1 Case on 1 Flash Card	
IV-C-1: Using a CD or DVD creation program, copy all images directly from the flash card to a blank CD-R or DVD-R (not CD-RW or DVD-RW). Select the "finalize" option in the software. Do not open and "save as."	While one might be tempted to just make one CD/DVD per case, this procedure ensures that all images are safely placed on a CD or DVD before proceeding. It also provides some insurance in the event a Master Negative for a particular case is lost or damaged, or the wrong images are placed onto the CD/DVD created for each case.
IV-C-2: Confirm that the creation of the CD or DVD was done correctly by: <ul style="list-style-type: none"> a. Opening the CD/DVD. b. Comparing the number and appearance of the images on the CD/DVD and the images on the flash card. c. Attempting to write a file to the CD/DVD you just created. d. If it is possible to write a file to the CD/DVD, the media was not finalized. Destroy the media just made and create another following the above procedures. 	
IV-C-3: The CD/DVD that was just created is the <i>Master Negative</i> for the flash card. Mark this CD as such, print out a contact sheet of all images on the CD/DVD, and bag and tag this CD/DVD as you would seized evidence.	
IV-C-4: Document the above process.	Forms to be developed at a later date.
IV-C 5: Now make a CD-R/DVD-R of all the photos on the flash card that pertain to a single case directly from the flash card. (Same as procedure IV-C-1, except only the images from a single case are being copied.)	
IV-C 6: Follow steps IV-C 2, IV-C 3, and IV-C 4 for the CD/DVD you just made. This is the <i>Master Negative</i> for the case images.	
IV-C 7: Repeat steps IV-C 5 and IV-C 6 for all the remaining cases on the flash card.	
IV-C 8: For each case, make other CDs/DVDs (using the same procedure as above) that will be needed by other officers, the lab, and the prosecutor. Ensure that sufficient copies are available for those officers that need them. The CDs/DVDs you create here are <i>Negative Duplicates</i> .	While any of the CDs/DVDs can be the source of additional copies, making copies now that can be copied later will avoid having to go to the <i>Master Negative</i> .
IV-C 9: Delete all images from the flash card.	Same comments as Step IV-A/B 6.

* The term *traditional enhancements* is one used in, and adopted completely from, *Recommendations and Guidelines for the Use of Digital Image Processing in the Criminal Justice System* by the Scientific Working Group on Imaging Technologies (SWGIT), Version 1.2, June 2002.

Traditional enhancement is defined in that document as:

“Traditional enhancement techniques are techniques that have direct counterparts in traditional darkrooms. They include brightness and contrast adjustment, color balancing, cropping, and dodging and burning. These traditional and acceptable forensic techniques are used to achieve an accurate recording of an event or object.”

“Brightness adjustment is used when the image is too bright or too dark. If the image is made too bright, there is a risk of loss of detail in light areas. If the image is made too dark, there is a risk of loss of detail in the dark areas.”

“Color balancing is the adjustment of the color components of an image. The purpose of color balancing is to render the colors in the scene faithfully. Improper color balance adjustment can render colors inaccurately, and objects will appear to have the wrong color when compared to the actual subject.”

“Contrast adjustment is used when the image lacks sufficient contrast. If the image contrast is increased too much, there is a risk of loss of detail in both light and dark areas. “

“Cropping is used to remove that portion of the image that is outside the area of interest. Dodging and burning have the same effect as brightness adjustment but are used in localized areas.”

“Spotting traditionally has been used to remove artifacts due to dust and scratches on the negatives, but it is not considered to be an acceptable practice on any forensic image.”

“Note: The use of spotting and cropping techniques may come under scrutiny in a court of law. Specific agency policies should address the use of these techniques.”

Traditional enhancement should be distinguished from non-traditional enhancement.

“Some nontraditional image enhancement processes are used and accepted by a variety of scientific fields such as medicine, aerospace, and cartography. These processes have no direct counterpart within traditional silver-based photography. In fact, only recently have they been applied within the forensic environment; therefore, their general acceptance may be subject to challenge. Examples of nontraditional processes discussed here are color processing, linear filtering, nonlinear contrast adjustments, pattern noise reduction, and random noise reduction.”

“Color processing includes color space transformations, pseudocoloring, and hue and saturation adjustments. These techniques can be used to modify the color characteristics of objects within an image. Caution: Application of these techniques can compromise the color fidelity of the image. “

“Linear filtering techniques include sharpening, deblurring, edge enhancement, and deconvolution. They are used to increase the contrast of small detail in an image. If a low degree of enhancement is used, the image will remain an accurate representation of the scene. If a high degree of enhancement is used, the image may no longer be an accurate representation of the overall scene, though still may be useful as an adjunct for interpretation of small details. Caution: A high degree of enhancement can also increase the visibility of existing noise and artifacts. Examples of noise include film grain, snow appearing on a TV screen, or random color dots.”